

REMARKS

Applicants have carefully studied the Office Action of November 3, 2006 and offer the following remarks in response thereto.

Objection to the Drawings

In the Office Action the drawings are objected to under 37 CFR 1.83(a) as not showing every feature of the invention specified in the claims. Specifically the Office Action states that "at least one input of said plurality of inputs in communication with each of said first, second, third, and fourth outputs" (claim 1) is not shown.

Applicant respectfully directs the Examiner's attention to Fig. 1 which clearly shows: a GPS; an INS/IMU; and a magnetometer, each with an output connected to a microcontroller (computing device). The direction of signal flow is clearly shown as outputs from the GPS, INS/IMU, and magnetometer, each to an input of the computing device. Referring to paragraph 99 of the specification, the INS/IMU 130 is described as including a 3-axis gyro and a magnetometer. Thus every feature specified in the claims, as enumerated in the Office Action, are shown in Fig. 1, in complete compliance with 37 CFR 1.83(a)..

Thus, Applicant respectfully requests that the Examiner withdraw the objection to the drawings.

Rejection Under 35 U.S.C. § 102

Claims 1, 3, 5-11, 14, 55 and 56 presently stand rejected under 35 U.S.C. 102 as allegedly being anticipated by Lin, et al. (US 2002/0021245A1). Lin, et al. describes an integrated GPS/IMU microsystem employing MEMS inertial measurement devices, a GPS, and a magnetometer.

Regarding claim 1, Lin, et al. does not disclose a database of the earth's magnetic field as required by claim 1. While claim 1, as originally filed, was sufficient to be patentable over Lin, et al., out of an abundance of caution Applicants have amended claim 1 to clarify that the database contains known vectors of the earth's magnetic field at precise locations and further, that at such a location the attitude of the inventive system is found by determining the angular difference between the vector retrieved from the database and the earth's magnetic field measured by the magnetometer. Lin, et al. does not disclose such a database, let alone using the difference between a vector stored in the database and the measured vector to determine an attitude of the system.

In contrast, Lin, et al. discloses a tilt compensated magnetometer which was well known in the prior art at the time Lin, et al. was filed. As described by Lin, et al. a tilt compensated magnetometer must know the attitude of the system, as determined in Lin, et al.'s case by the gyros, and transforms the three dimensional magnetic vector to a flat plane to determine the heading. There is no need to look up the direction of the magnetic vector because it is simply projected into the horizontal plane to find a heading. Lin, et al. only uses the magnetometer to determine a heading (one angle of the system's heading) while the inventive system

uses the magnetic vector to determine all three axis of attitude, azimuthal (heading), pitch, and roll (see Lin, et al. at ¶¶ 71, 118-123, 142, and 156).

This is significant in the present invention because presently MEMS-type gyros have significantly greater drift than other commonly used types of gyros. Lin, et al. only corrects the drift in one axis through the use of the magnetometer so the pitch and roll axis will continue to drift and accumulate significant errors over time. The inventive system determines attitude in all three axis and thus all gyro drift is corrected, not just one axis.

As an aside, the Office Action asserts, in a separate rejection of other claims under 35 U.S.C. § 103, that a second Lin reference (USPN 6,415,223) discloses a database of the magnetic fields of the earth. This assertion in the Office Action is wrong. Neither Lin, et al. nor Lin disclose a database of the earth's magnetic field or using such a database, along with a measured vector of the earth's magnetic field, to determine attitude.

Accordingly, Applicant respectfully submits that claim 1 is in condition for allowance. Claims 3, 5-11, and 14 depend from claim 1 and, at least for the reason stated with regard to claim, are likewise in condition for allowance.

Similarly, claim 55 has been amended to clarify the relationship of the database to determining an attitude and thus, claim 55 is likewise in condition for allowance. Claim 56 depends from claim 55, and therefore is also in condition for allowance.

Rejections Under 35 U.S.C. § 103(a)

Claims 2 and 21 presently stand rejected under 35 U.S.C. 103(a) as allegedly unpatentable over a combination of U.S. Patent Publication 2002/0021245A1 (Lin, et al.) and U.S. Patent No. 6,522,298 B1 (Burgett, et al.).

With regard to claim 2, as detailed with regard to claim 1, Lin, et al. does not anticipate claim 1 and claim 2 depends from claim 1, thus claim 2 is patentable over the combination suggested in the Office Action, Burgett, et al. does not add a database of the earth's magnetic field. This rejection is respectfully traversed.

Claim 21 has been withdrawn from consideration.

Claims 4, 13, 16, 19, 20, 22, 24-26, and 29-32 presently stand rejected under 35 U.S.C. 103(a) as allegedly unpatentable over a combination of U.S. Patent Publication 2002/0021245A1 (Lin, et al.) and U.S. Patent No. 6,415,223 (Lin).

With regard to claims 4, 13, and 16, these claims depend from claim 1 and neither reference discloses a database of the magnetic field of the earth, or using data from such a database along with a measurement of the earth's magnetic field to determine an attitude in three dimensions, as required by claim 1. Accordingly, this rejection is respectfully traversed.

Claims 19, 20, 22, 24-36, and 29-32 have been withdrawn from consideration.

Claim 23, 27, and 28 have been withdrawn from consideration.

Claims 17 and 18 presently stand rejected under 35 U.S.C. 103(a) as allegedly unpatentable over a combination of U.S. Patent Publication

2002/0021245A1 (Lin, et al.) and U.S. Patent No. 6,202,931 B1 (Billebaud) and/or EPO697806A1 (Simmons).

Once again, Lin, et al. does not disclose the database of the earth's magnetic field or using data from such a database to compute an attitude in three dimensions from magnetometer measurements, as required by claim 1. Neither Billebaud or Simmons discloses such a database. Claims 17 and 18 depend from claim 1 and, at least for the reasons stated with regard to claim 1, are likewise in condition for allowance.

Moreover, the dependent claims discussed above contain additional novel and patentably distinct features as well, many of which were detailed in Applicant's prior response to the first Office Action in this case. However, in view of the differences between the independent claims and the cited patent publications, a detailed review of these additional novel features is not deemed necessary at this time.

In the Office Action Responses to Arguments, it is stated with regard to Lin, et al. that "the processor (5) should include a database for storing the earth's magnetic field data from the processing interface (42)." There is no support for this statement in the cited references and, in fact, it is simply not true. As stated above, no database of the earth's magnetic field is required to determine magnetic heading in a three axis magnetometer with tilt compensation.

Reservation of Right to Challenge Cited Items

While Applicants have elected to respond to the Office Action by making various amendments and/or arguments as set forth herein, this should not be construed as an admission that any of the cited patent publications constitutes prior art or otherwise provides an enabling disclosure. Applicants reserve the right to challenge the sufficiency of the cited patent publications as qualifying prior art at a later point in time, including in any post-issuance proceeding or suit, if appropriate.


Request for Allowance

The undersigned has made a good faith effort to respond to all of the rejections in the case and to place the claims in condition for immediate allowance. Nevertheless, if any unresolved issue remains, the Examiner is invited to contact the undersigned by telephone to discuss those issues so that the Notice of Allowance can be mailed at the earliest possible date.

It is respectfully submitted that the instant application stands in condition for allowance, and a Notice of Allowance is earnestly solicited.

Respectfully submitted,

Dated: January 24, 2008

By: 
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